COLLECTIVE INNOVATION

Enjoy the Mess!

Open Hardware Summit – September 6th, 2013

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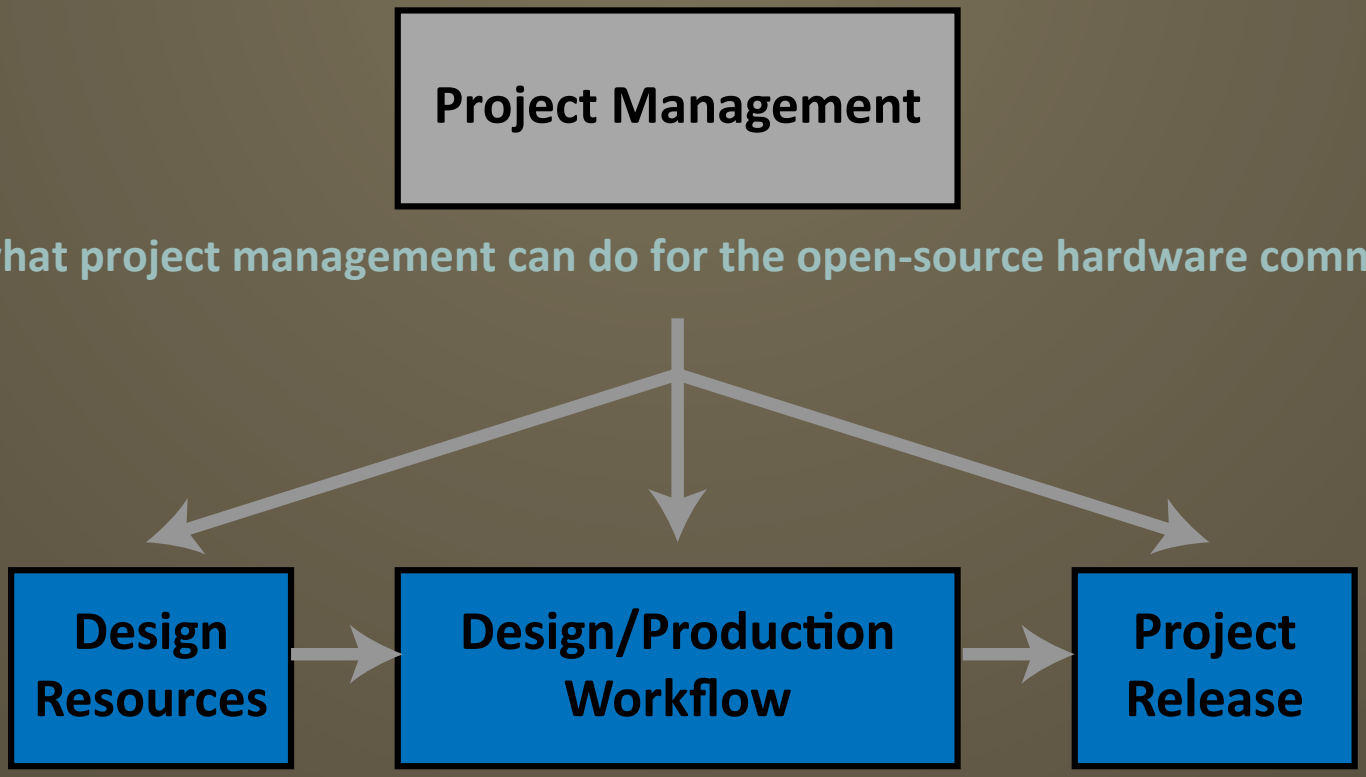
WHAT THIS TALK WILL COVER



THE DEFINITION OF PROJECT MANAGEMENT

Project management is a broad collection of tools and methodologies to positively direct team and organizational dynamics. Project management is both an ethos of organization and the set of enabling tools. ***The intended function of any project management framework is to facilitate effective communication and work in a diverse community of contributors***.

Project Management has a not-often-sung history in improving the overall productivity of an industrial societies since 1917. For background and materials, check out the Project Management Institute: http://www.pmi.org/

THE DIFFERENCE BETWEEN MANAGEMENT AND DESIGN

… a designer always asks …

“How are we going to make this?”

… while a project manager asks …

“How do we stay organized so that we can work more effectively and increase our chances of making something awesome?”

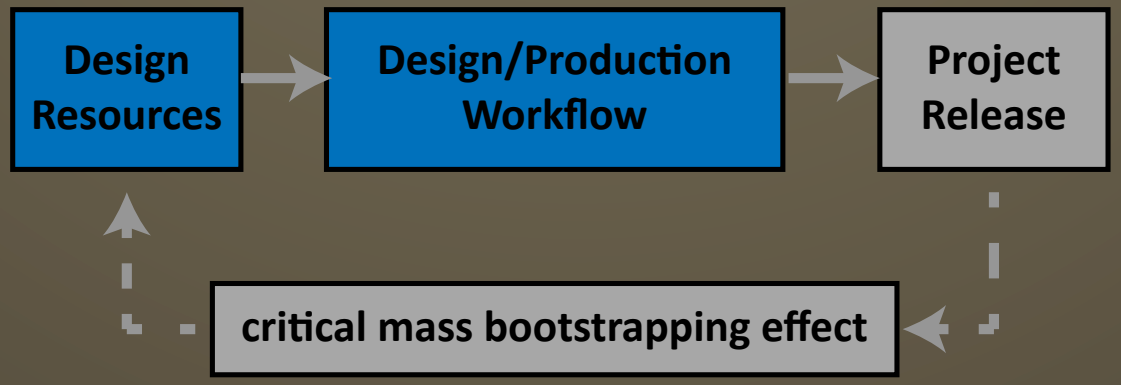
WHERE IS OSHW TODAY, COMPARED WITH YESTERDAY?

- **2011 – OSHW DEFINITION 1.0**
  - ❑ Tangible artifacts
  - ❑ Release design files (schematics, Gerbers)
  - ❑ Use OSI/OSH licensing standards
- **2013 – NEW! Sharing Best Practices!**
  - ❑ Original Design Files (schematics, Gerbers)
  - ❑ Auxiliary Fabrication Files (drawings)
  - ❑ Assembly Files (bill of materials)
  - ❑ Assembly Instructions
  - ❑ Basic Design Explanations
  - ❑ Basic Use Instructions
  - ❑ Use of Associated Software

Open Source Hardware Definition 1.0 : http://www.oshwa.org/definition/
OSHW Sharing Best Practices : http://www.oshwa.org/sharing-best-practices/

WE'RE SHARING MORE EVERY DAY

- **The community itself is exponentially growing.**
  - EEs, MEs, software engineers, hobbyists, scientists, interested consumers, students, artists, hybrid hexapod robots and more!
- **The number of released projects keeps going up. And up. And more up.**
  - Raspberry Pi-everything. Wearables. New Arduino variants. Radio modules. Internet of everything! Every month people are finding new applications for open source hardware.



People are sharing so much - it's great! But it's definitely getting messy out there.

THE COMMUNITY IS RISING TO THE CHALLENGE

Some groups are working on collaborative CAD frameworks

- ❑ circuits.io (www.circuits.io/)
- ❑ Upverter (www.upverter.com/)

Others are working on lightweight project management tools

- ❑ Open Design Engine (www.opendesignengine.net/)

But no "Thingiverse of Circuits," yet:

- ❑ There's no STL equivalent for circuits to allow easy mash-ups
- ❑ Any definite design resource collection requires having an active curator.

COLLECTIVE GROWING PAINS ARE PART OF THE PROCESS

Diversity means innovation, but everyone contributing in a crowded space can also produce a lot of chaos and confusion.

- ❑ Multiple solutions for every problem (boards, tools, fabrication services)
- ❑ Different tool chain preferences means we can't automatically combine libraries or source files
- ❑ There is no one best reference source (i.e. no "Thingiverse" for circuits)
- ❑ More stuff = harder for beginners
- ❑ It's difficult for new projects to reach critical support thresholds.
- ❑ We can't homogenize the community without suffering (walled gardens)
- ❑ ***We've got to stay the course!***

Read up on Organizational Growth and Decline:
http://www.practical-management.com/Organization-Development/Organizational-lifecycle-and-decline.html/

PROJECT MANAGEMENT PHILOSOPHY IS RELEVANT HERE

Usually, when engineers see problems – they make more rules.

There is no unified theory of getting things done.

There's no right tool for every job (there are too many jobs)!

Good projects are compound investments. Enabling new work today is often better than having the perfect solution in a year.

PROJECT MANAGEMENT - 101

You have a great idea and want to start an open-source hardware project today! Some day, you'll have a company.

How do you self-organize?*

Self-organization is very much the innovation model at the Wyss Institute: http://wyss.harvard.edu/

TO START: EVERY PROJECT NEEDS A BATTLE PLAN

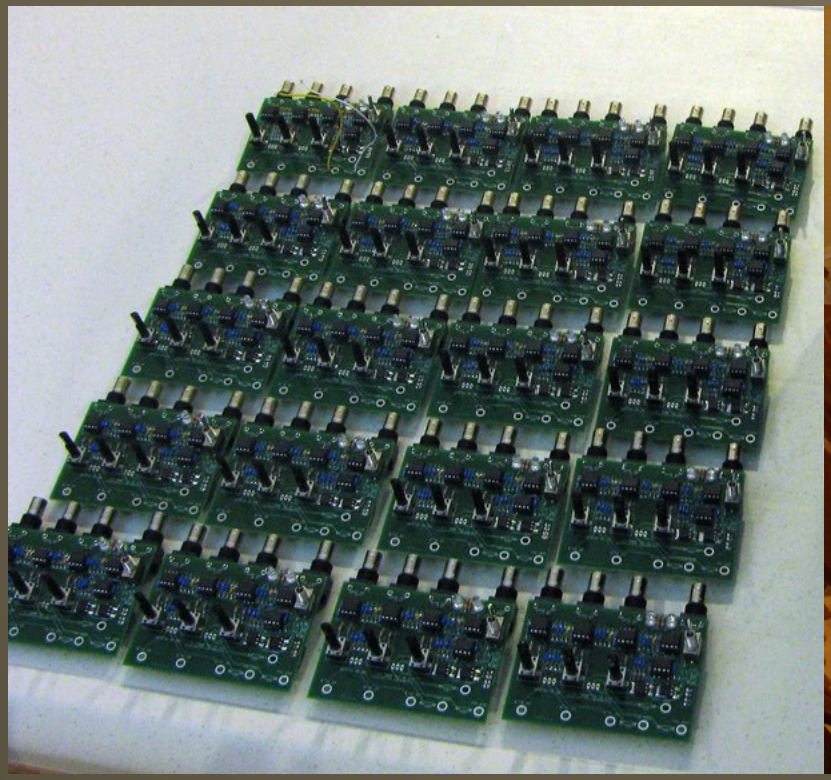
- **Draw a line in the sand:**
  - Define what your project is. Set some goals.
- **Choose your strategy:**
  - Identify your team and your stakeholders. They are your greatest asset. Assign each team member clear roles and responsibilities. **FYI:** Your team/goal dictates your tool chain.
- **Pick a leader:**
  (or commit to a decision-making strategy)
  - Someone has to have the authority to make judgment calls. Without this, projects stall.
- **Assign tasks:**
  - Make individual assignments. If everyone's responsible for a thing, no one remembers to do it. Ensure accountability.
- **Track your progress:**
  (or risk accidentally repeating WW-SMD)
  - Without a record of work or realistic progress updates, the most brilliant work is still vaporware and you'll spin your wheels.
- **Keep it together:**
  - Teams don't magically run themselves. In order to adapt to set-backs and conflict, keep everyone in regular communication.

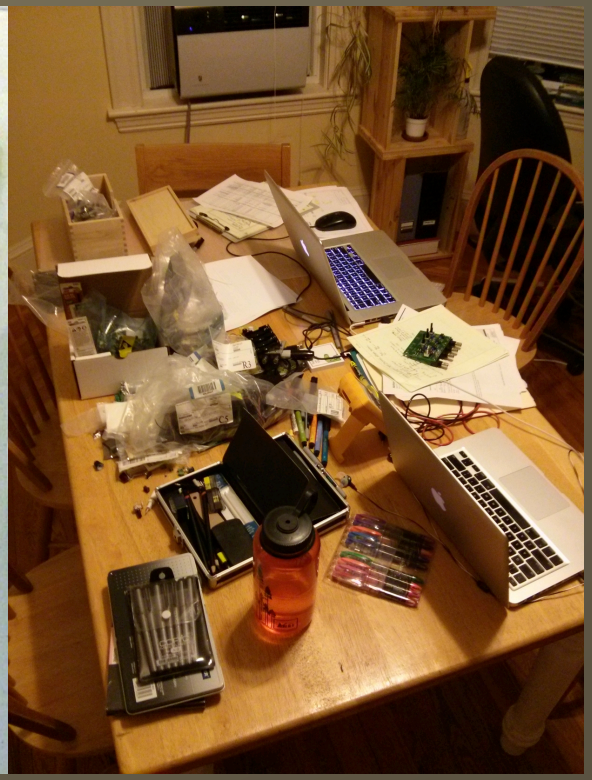
EVERY PROJECT HAS 4 BASIC TECHNICAL NEEDS

- **COMMUNICATION**
  (When did you start working here?)
  - Make it possible for team members to communicate with one another
  - Communication needs to happen often – so don't pick a method that's painful
  - Keep minutes of discussions/decisions
- **TASK MANAGEMENT**
  (I thought Bob was doing that?)
  - Have a way to assign and manage tasks
  - Rank tasks by priority and completion
  - Chose standards for closing out jobs
  - Be able to to add issues that weren't in the original action plan (bug tracker)
- **SCHEDULING**
  (We can worry about that later…)
  - Understand task dependencies
  - Keep track of critical resource allocations
  - Flag critical-path or blocking actions
  - Early-warning system for potential meltdown
- **FILE MANAGEMENT**
  (Where did our release image go?)
  - A readable repository for documentation
  - Indexed/searchable meeting minutes
  - Design file repository with version control
  - A public site to publish release files

A REAL EXAMPLE OF OPEN-SOURCE PROJECT MANAGEMENT

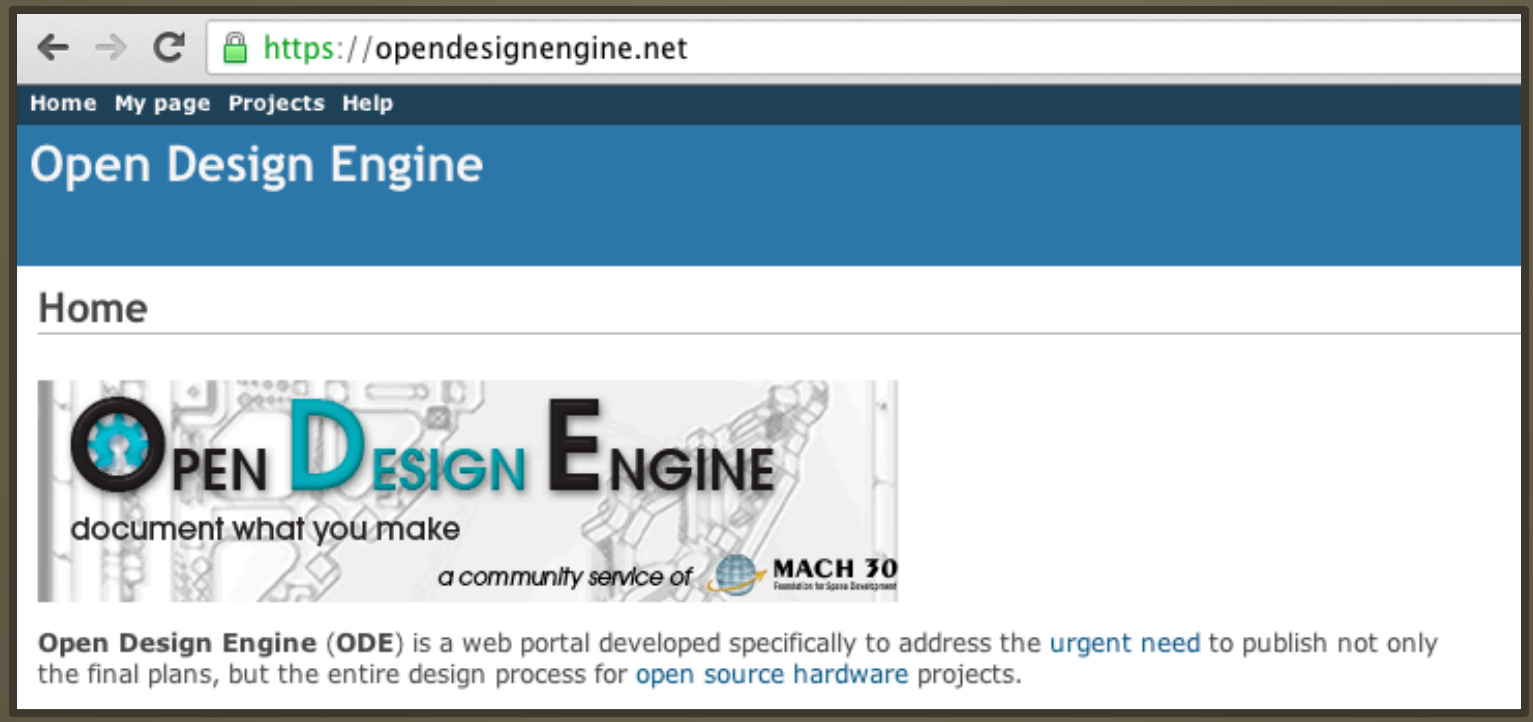
I have an **small EKG pre-amp** project that's been on my shelf for several years. The hardware works, **but the project stalled** at the mechanical assembly step.





Since my personal project management style is a **folder full of notes and Post-Its**, it's been a challenge to get this project out of the house.

OPEN DESIGN ENGINE – A LIGHTWEIGHT FRAMEWORK



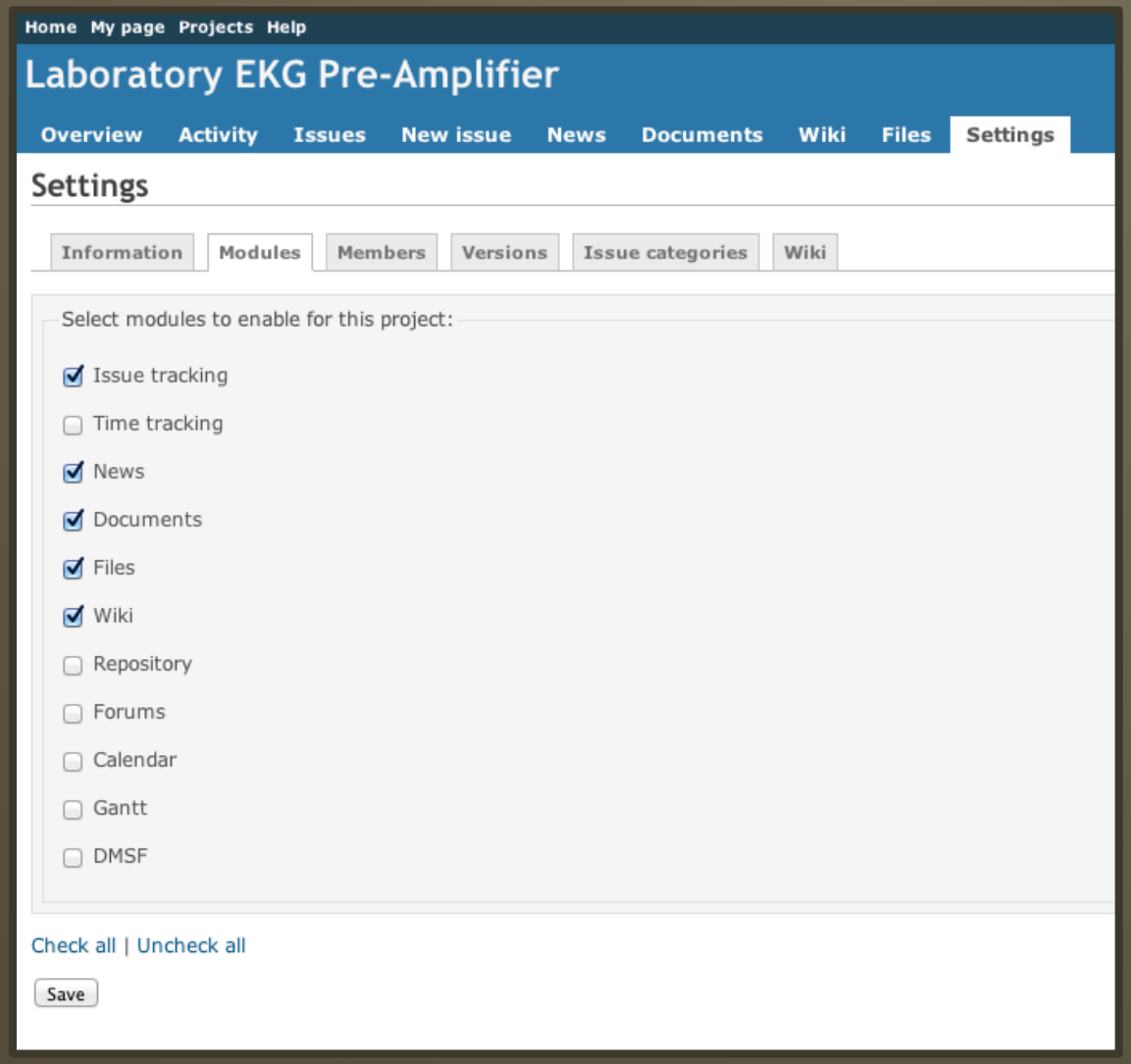
The team at **Mach 30** is as excited about documentation as I am.* That lead them to create the Open Design Engine. **ODE is a WordPress-like framework** (built on Redmine) that gives you an ultra-simple way to make a **central project "portal"** with all the communication, scheduling, task management and document publication tools that you need to both **document and manage a project out in the open**. It's bare-bones, it's flexible and it's fast.

Right now, ODE is working to get critical mass and actively looking for users and developers.

*See: Open Sourcing The Engineering Design Process - http://2011.oshwa.org/files/2011/09/Wozniak-OHS2011.pdf
*See: "An Urgent Need In Open Source Hardware" - http://mach30.org/2011/09/23/an-urgent-need-in-open-source-hardware/

OPEN DESIGN ENGINE – GETTING STARTED

- Go to: http://opendesignengine.net/projects

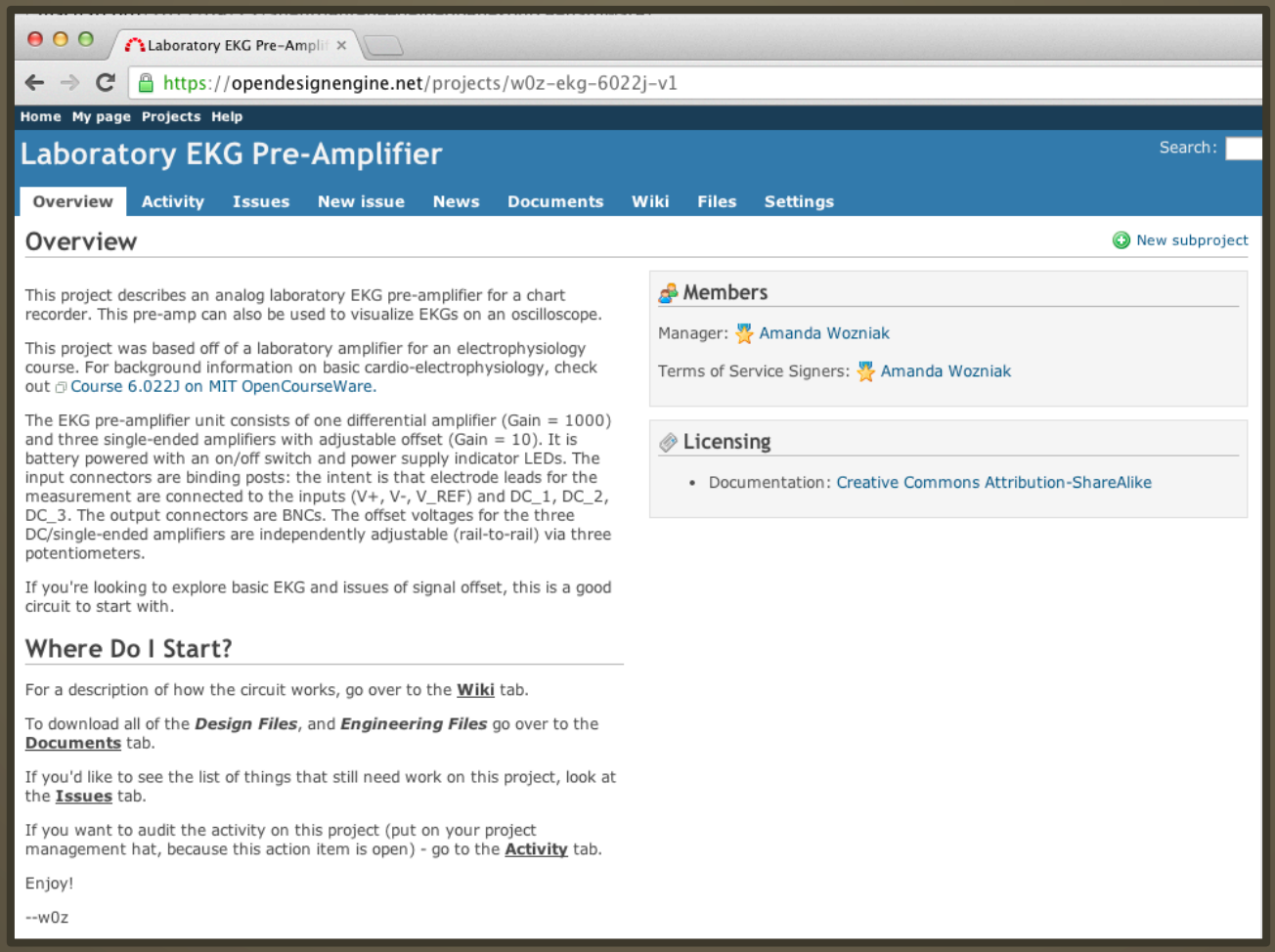


- Create New Project
- Select your PM Modules
- Select your OHS License
- Choose your permalink
- Go to town!

ODE is very much a Redmine kind of tool, so you'll have the usual fun with wiki filenames and cross references. But the ability to have everything in one place really facilitates good conversation – even with a dev team of one.

IN FACT: *being forced to write up my mechanical issues made me think of at least two new ways to (maybe) fix the problem.*

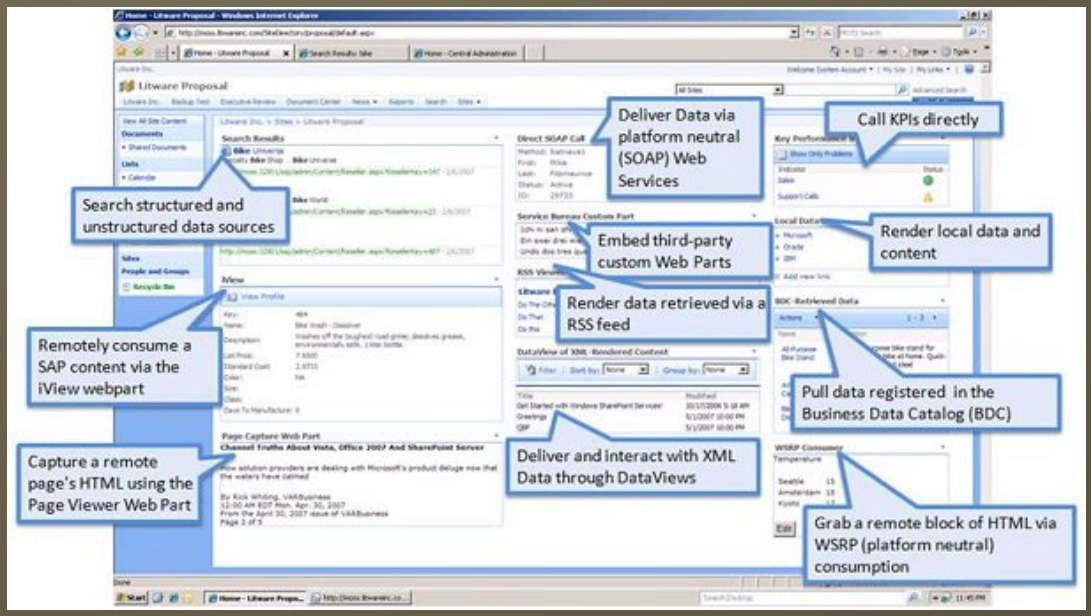
OPEN DESIGN ENGINE – EKG PRE-AMPLIFIER PROJECT



- Conforms to the OSHW Sharing Best Practices
- Everything's easily accessible via the top-level tabs
- I'll keep maintaining this project, so go exploring and dig in!

ENTERPRISE SOFTWARE PROVIDES ALL-IN-ONE SOLUTIONS

A holy grail of industry is the finding the perfect Product Lifecycle Management System



Primavera – Oracle SAP – MS SharePoint – SalesForce – Altium Vaults – SolidWorks PLM

More information on PLM - http://en.wikipedia.org/wiki/Product_lifecycle_management
SharePoint Screenshot via - http://readwrite.com/2010/06/04/in-the-social-enterprise-battle-usability-will-drive-competition

MATCH YOUR TOOLS TO YOUR TEAM – AND STAY FLEXIBLE

Many of the all-in-one project management systems try to be so all-inclusive and flexible that they become bloated and difficult to use. Even these Enterprise-level Design Control systems and Product Lifecycle Management tools still only support one workflow or tool-chain well (and all others poorly). If updating or auditing the project management system takes more work than closing out the next open action item, you're sunk!

The value of any project management tool lies entirely in the collective buy-in of the team that has to use it. Use what works.

WHAT TOOLS ARE SUCCESSFUL OSHW BUSINESSES USING?

• **TEAM ORGANIZATION**	• Assigned leaders and project managers
• **COMMUNICATION**	• ***REGULAR MEETINGS!***, sneaker-net, wikis, Google+ hangouts, mailing lists, commit logs
• **TASK MANAGEMENT**	• Spreadsheets, Bugzilla, ticketing systems, MS Project
• **RECORD KEEPING**	• Google Docs, GitHub, internal tutorial system, Enterprise Resource Planning System, wikis
• **SCHEDULING**	• Google Calendar, MS Project, hand-maintained Gantt-charts
• **FILE MANAGEMENT & REPOSITORIES**	• Internal servers, DropBox, GitHub

Dev team sizes range from 2 to 20+ people. Teams consist of electrical, mechanical, software and production engineers.

A PHILOSOPHICAL ENDING

Let's embrace the mess. Understand that the engineering impulse to come up with "the best solution ever," can often create walled gardens, **so don't split the party unless you have a good reason to do so.** As you design, think up **core tools** that would enable you to do better work, then contribute to them. Those same tools will let individuals and teams with **different backgrounds** to **work together** more readily. **Fork designs and merge communities.** Don't despair if it takes a while for your project to reach critical mass. Superior tools and solutions will catch on naturally over time. **We all need community support to thrive**, and the community will naturally promote good work. Bad solutions and mediocre improvements will eventually die out. ***OSHW is a collective. That's how it wins.***

ACKNOWLEDGMENTS!

OSHW Pen-Pals

Mariano Alvira, Ayah Bdeir, Limor Fried, Bre Pettis, Nathan Seidle, J. Simmons, Phillip Torrone

The complex collective that is the Wyss Institute for Biologically Inspired Engineering

GOT QUESTIONS? GOT COMMENTS?

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